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# Regional Economic Impact Analysis For the Proposed Kingdom Community Wind Project

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Prepared for  
Green Mountain Power Corporation

by Kavet, Rockler & Associates, LLC

May 2010

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# Regional Economic Impact Analysis For the Kingdom Community Wind Project Proposed by Green Mountain Power Corp.

*Prepared by Kavet, Rockler & Associates, LLC – May 2010*

## 1) Overview and Summary

The purpose of this analysis is to evaluate the regional economic impacts associated with the Kingdom Community Wind project (hereafter, KCW) proposed by Green Mountain Power Corporation in the town of Lowell in Orleans County, Vermont. The project consists of the construction and operation of 20 to 21 wind turbines with a total nameplate electric generation capacity of between 50 and 63 megawatts, depending upon two possible project configurations analyzed herein.

The initial economic investment associated with either project configuration is expected to total approximately \$150 million, with ongoing annual expenditures of more than \$4 million, concentrated in Orleans County. The average net output of the facility is expected to be sufficient to provide enough energy to power approximately 20,000 Vermont homes. Assuming the necessary permits and approvals are granted, the planned construction of the project is expected to occur in 2011 and 2012, with full annual operation expected in 2013.<sup>1</sup>

The analysis herein shows the construction and operation of the project will bring significant economic benefits to Orleans County and the State of Vermont, resulting in the creation of more than 700 jobs (direct and secondary) during the construction and development period in 2010-2012 and about 30 permanent new jobs in 2013 and beyond. About 80% of the initial employment gains and about half of the new permanent jobs are expected to be in Orleans County. This project is likely to generate more than \$2 million in State tax revenues during the construction and development phase, with ongoing State revenues totaling about \$24 million over the 25 year initial life of the facility. The direct fiscal benefits to the Town of Lowell are expected to average more than \$500,000 per year, totaling about \$15 million over the 25 year initial facility life.

There are clear and substantial benefits from additional electric power generation with the unique economic and environmental characteristics of wind energy. It is consistent with the expressed desire of the State of Vermont, other New England states, and the U.S. Government through various legislative acts and other public directives for the development of clean, renewable, local energy sources. This project will help to meet electrical demand from both economic and population growth in Vermont and New

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<sup>1</sup> Although the facility is expected to be fully operational before the end of 2012, because 2013 will be the first full year of operation, for purposes of this analysis operational economic impacts are not assumed to begin until 2013.

England and diversify State power sources. This project will generate significant additional electrical capacity – all of which is expected to be sold within the State - and provide clean, safe and competitively priced power to Vermont residents.

## 2) Economic Impacts in Vermont

The proposed Kingdom Community Wind development is expected to represent a total investment of more than \$150 million in current 2010 U.S. dollars, with a development and construction phase in 2010-2012 and full annual operation commencing in 2013. For both project configurations, the direct expenditure stream from the operation of the facility is expected to total more than \$4 million per year, more than half of which will be associated with in-State expenditures, including 5.5 permanent workers directly employed in connection with the facility. The economic impacts associated with the proposed development were evaluated with the use of a detailed regional economic and demographic model that estimates all direct, indirect and induced economic impacts.

### **Economic Model Background**

The core economic model used to perform the regional economic impact analysis herein was developed by Regional Dynamics, Inc. (REDYN)<sup>2</sup>. The REDYN model is a dynamic, multi-regional, nonlinear, endogenous, Input-Output (I/O) economic and demographic model based on the North American Industrial Classification System (NAICS). The model is based on I/O methodology, with detailed make and use tables and social accounting matrix features for all entities, a comprehensive commodity production transformation function, and impedance-based commodity trade flows developed by Oak Ridge National Laboratories.

The model estimates employment, output, wages, occupations, income, gross product, demand, self-supply, trade flows and demographic impacts associated with user-defined economic events, such as the subject analysis. All model inputs associated with this analysis were developed with general project data from KCW and in consultation with REDYN model architects and principals, Dr. Thomas Tanner and Tre Hutchinson. The model specification included all construction, development, equipment purchases, and estimated operational expenditures. Based on these direct inputs, the REDYN model estimates secondary indirect and induced impacts for the region and state, as well as demographic impacts.

The REDYN model constructed for this analysis consists of three regions: Orleans County; a Balance of Vermont region combining the remaining 13 Vermont counties; and a Balance of U.S. region encompassing the remainder of the country.

### **Economic Model Inputs**

More than half of the initial \$150 million total investment under both project configurations will be for specialized wind turbines and associated turbine systems that

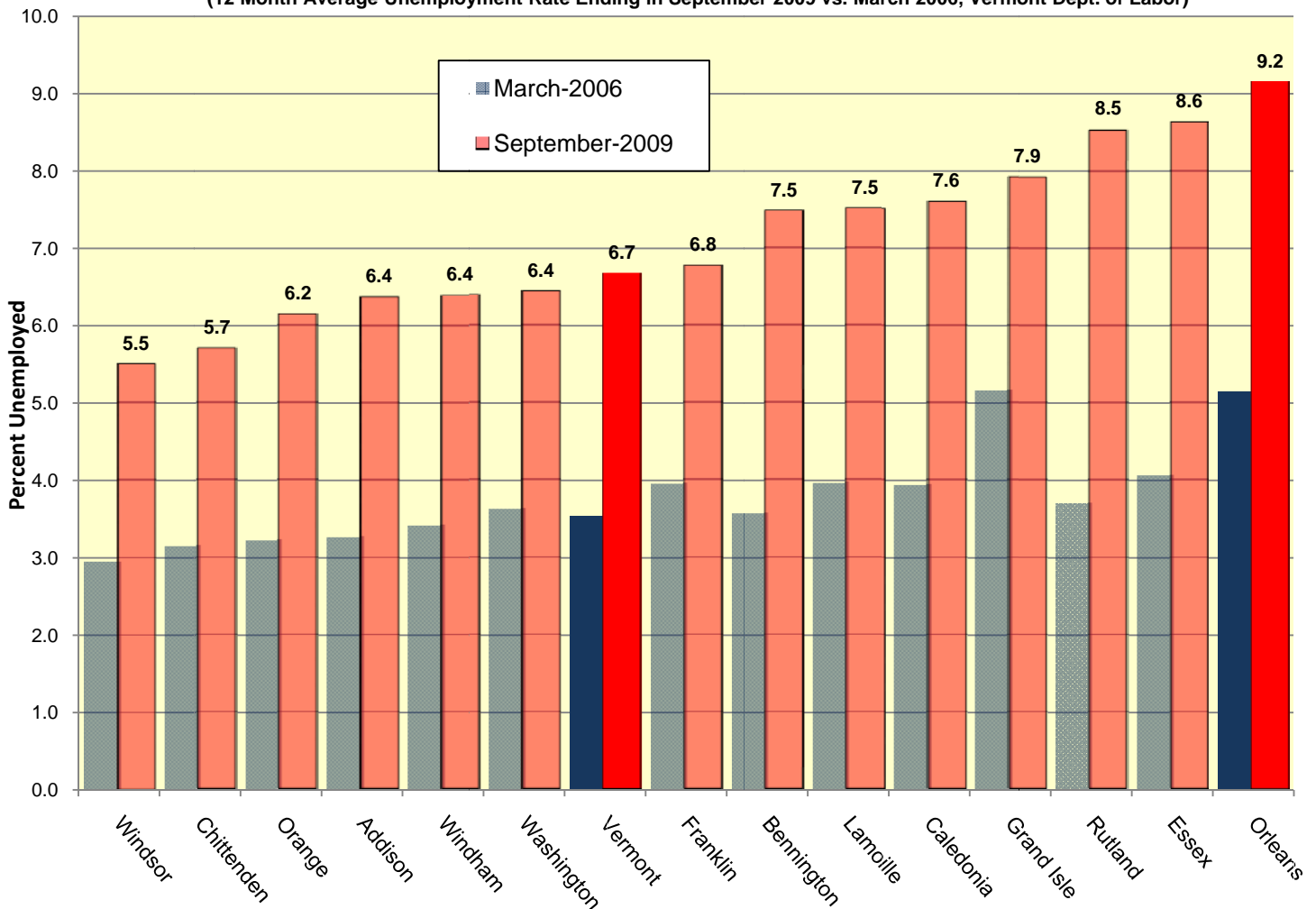
<sup>2</sup> See [www.regionaldynamics.com](http://www.regionaldynamics.com) for additional methodological and background information on the REDYN model

are not manufactured in Vermont, and thus will result in virtually no in-state economic impacts. The primary economic impacts in Vermont will be associated with the development, construction and operation of the proposed generation facility. More than half of the roughly \$48 million in construction and development expenditures and about 60% of the ongoing \$4+ million per year in operational expenditures are expected to result in direct Vermont impacts.

### Economic Model Output

During the construction and development phase, this project will generate total employment gains in the State of more than 700 jobs (full time equivalent job years), with about 80% of these in Orleans County. In 2013 and beyond, operation and maintenance of the wind turbines will generate an annual total employment impact in the State of about 30 jobs, with at least half of these expected to be in Orleans County.

**Chart 1**  
**Orleans County Labor Market Ranks Worst in State During Current Recession**  
 (12 Month Average Unemployment Rate Ending in September 2009 vs. March 2006, Vermont Dept. of Labor)



In addition to these jobs, the project will generate growth in total State economic output of more than \$50 million during construction and development, with ongoing annual disposable income gains of nearly \$3 million per year. State General and Transportation Fund fiscal impacts (excluding Education Fund property taxes) are expected to exceed \$2 million during the construction and development phase and total more than \$13 million over the 25 year life of the project. Initial direct State and local property tax payments are expected to total nearly \$1 million per year, with escalating land lease payments (most of which are local) expected to start at more than \$320,000 per year.

Because the project is expected to generate very little in the way of new demand for state or local services, most of the property tax payments from this project are expected to result in reductions in local property taxes and concomitant increases in disposable income among existing host town residents. It is assumed that most of the State property tax revenues and, to a lesser extent, lease payments associated with this project will have similar, though more widely dispersed net economic effects.

The net economic impacts associated with this project represent significant economic benefits to the State and region, especially during the present period of severe economic stress. Given that Orleans County currently has the highest unemployment rate of any county in the State (see Chart 1, preceding page), and has experienced one of the steepest increases in unemployment of any county in Vermont during the current economic downturn, the economic benefits detailed herein will have enhanced fiscal, economic and social value. This is especially true for the Town of Lowell, which reported a staggering 13.6% average annual unemployment rate in 2009, the 8<sup>th</sup> highest rate among 247 reporting Vermont towns, and more than double the state-wide average annual rate calculated on the same basis.

**Table 1: Selected Economic Impact Metrics, Relative to Baseline  
50MW Project Configuration**  
*(Thousands of Current Dollars, Except Employment and Population)*

Concept	Region	Aggregate 2010-2012	2013	2014	Minimum Annual 2015 to 2037
Total Employment (jobs)	Orleans County	571	16	16	16
Total Employment (jobs)	Balance of Vermont	157	14	14	14
Disposable Income	Orleans County	\$23,376	\$1,402	\$1,432	\$1,475
Disposable Income	Balance of Vermont	\$8,921	\$1,278	\$1,307	\$1,340
Output	Orleans County	\$39,158	\$3,337	\$3,500	\$3,677
Output	Balance of Vermont	\$13,944	\$3,194	\$3,349	\$3,515
Wage Bill	Orleans County	\$23,462	\$786	\$805	\$827
Wage Bill	Balance of Vermont	\$7,399	\$811	\$833	\$858
Population (persons)	Orleans County	67	68	69	9
Population (persons)	Balance of Vermont	18	19	20	4
Tax Revenue	State and Municipal Total	\$2,054	\$1,135	\$1,147	\$1,160

**Table 2: Selected Economic Impact Metrics, Relative to Baseline  
63MW Project Configuration  
(Thousands of Current Dollars)**

<b>Concept</b>	<b>Region</b>	<b>Aggregate 2010-2012</b>	<b>2013</b>	<b>2014</b>	<b>Minimum Annual 2015 to 2037</b>
Total Employment (jobs)	Orleans County	584	16	16	16
Total Employment	Balance of Vermont	158	14	14	14
Disposable Income	Orleans County	\$23,592	\$1,491	\$1,520	\$1,564
Disposable Income	Balance of Vermont	\$8,990	\$1,319	\$1,349	\$1,382
Output (\$000)	Orleans County	\$39,524	\$3,372	\$3,534	\$3,712
Output (\$000)	Balance of Vermont	\$14,053	\$3,220	\$3,375	\$3,542
Wage Bill (\$000)	Orleans County	\$23,681	\$804	\$823	\$846
Wage Bill (\$000)	Balance of Vermont	\$7,454	\$824	\$846	\$871
Population	Orleans County	67	69	70	10
Population	Balance of Vermont	18	19	20	4
Tax Revenue (\$000)	State and Municipal Total	\$2,072	\$1,228	\$1,240	\$1,254

### 3) Additional Model Input Issues – Property Taxes and Tourism

#### Property Tax Valuations

The net property tax valuations used as economic model inputs herein considered the issue of potential property valuation declines associated with parcels in proximity to the proposed wind turbines. After an extensive literature review of the topic, it was determined that there was no empirical basis for any negative town or county adjustment for this effect. Although there is no question that there are individual property owners and potential property buyers who consider the proximity of wind turbines to be undesirable, there is no evidence that these opinions result in measurable negative impacts in aggregate town or county-wide property sales prices and valuations.

In fact, in some areas, there may be net positive property valuation effects due to the substantial additional property taxes paid by a wind facility. Especially in areas with relatively low property tax bases, such as the host community for this project, a significant reduction in town-wide property taxes on all existing properties due to relatively large tax payments made by the wind farm will eventually be capitalized in higher property valuations for these properties. These additional likely positive effects, which would probably occur over an extended time period, were not estimated or included in the model inputs used in this analysis.

Most extant analyses on the topic of property valuations and proximity to wind farms are based on anecdotal information from affected property owners, local realtors, wind farm proponents or wind farm opponents. Many are based on subjective surveys of opinion

and market conjecture rather than actual property transactions and real prices derived from completed sales. Most are based on very small sample sizes, in limited study areas, with limited general applicability. Few are scientifically constructed studies with any meaningful statistical significance or peer review.

The most rigorous, unbiased study on this topic to date is an analysis recently released by the highly respected Lawrence Berkeley National Laboratory.<sup>3</sup> Unlike most analyses on the topic, this comprehensive study relies on a large sample of actual property sales transactions, applies state-of-the-art analytic statistical techniques, and extensive field work to verify and quantify housing characteristics and wind farm proximity and views.

Based on their analysis of 7,459 property transactions associated with 10 study areas surrounding 24 wind facilities in 9 states, they found the following, as excerpted from the report abstract:<sup>4</sup>

- ***The various analyses are strongly consistent in that none of the models uncovers conclusive evidence of the existence of any widespread property value impacts that might be present in communities surrounding wind energy facilities.***
- ***Specifically, neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices.***
- ***Although the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been or could be negatively impacted, it finds that if these impacts do exist, they are either too small and/or too infrequent to result in any widespread, statistically observable impact.***

This study employed ten different modeling constructs to analyze three potential stigmas: 1) Area Stigma (A concern that the general area surrounding a wind energy facility will appear more developed, which may adversely affect home values in the local community regardless of whether any individual home has a view of the wind turbines) 2) Scenic Vista Stigma (A concern that a home may be devalued because of the view of a wind energy facility, and the potential impact of that view on an otherwise scenic vista), and 3) Nuisance Stigma (A concern that factors that may occur in close proximity to wind turbines, such as sound and shadow flicker, will have a unique adverse influence on home values). The study found that ***“the results are consistent across all models in that none uncovers conclusive evidence of the existence of any widespread property value impacts for any of the three stigmas.”***<sup>5</sup>

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<sup>3</sup> See: *The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis*, December 2009, by Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer and Gautam Sethi, at the Ernest Orlando Lawrence Berkeley National Laboratory. The Lawrence Berkeley National Laboratory is one of the best known and oldest of the nation's U.S. Department of Energy National Laboratories. There are currently 10 Nobel Laureates associated with the Laboratory.

<sup>4</sup> Ibid. page iii

<sup>5</sup> See study presentation slides, page 28, at: <http://eetd.lbl.gov/ea/ems/emp-ppt.html>

The only analysis to date performed on wind turbines and property valuations that included Vermont-specific data was undertaken by the Renewable Energy Policy Project (REPP) and included the existing Searsburg wind farm as one of the sites analyzed.<sup>6</sup>

The REPP report, published in May of 2003, examined more than 3,300 individual property transactions in and around the Searsburg wind farm, before and after its construction. As the only operating commercial wind farm in Vermont, and in a similar rural location as the proposed project, the Searsburg analysis has relevance to this project. In all three of the statistical regression models used in this analysis, the authors found that “average sales prices grew faster in the viewshed than in the comparable area” following construction of the wind turbines. The analysis of the Searsburg facility concluded that, “there is no significant evidence that the presence of the wind farms had a negative effect on residential property values.” The same report, which studied eight other U.S. wind farms in comparable detail, found “no evidence that wind development has harmed property values within the view shed.”

Another study specific to the Searsburg wind facility showed that public acceptance and support of the wind farm increased significantly after its construction and operation. This difference between actual and anticipated impacts, which may be attributable in part to a generalized resistance to change and fear of the unknown, has been demonstrated in other pre and post-development wind studies as well.<sup>7</sup>

Of further local relevance, it was determined in a recent Vermont Public Service Board finding<sup>8</sup> that for tax purposes, the Town of Wilmington, which is the largest population center adjacent to and with clear views of the Searsburg wind turbines, does not reduce the appraised value of properties that have views of the Searsburg turbines, nor does it even maintain records of which properties have such views. It also found that no Wilmington taxpayer has appealed their property tax assessment based on visibility of the Searsburg turbines.

While actual property transactions data are the only conclusive basis for measuring valuation changes due to the presence of wind farms, the most objective anecdotal information on this topic probably comes from tax assessors. A 2002 analysis employing an extensive survey of tax assessors in 13 U.S. counties, containing 22 recently developed wind farms, found “no evidence indicating that views of wind turbines decreased property values.”<sup>9</sup> The study also opined that “[o]ne of the likely reasons that wind turbines do not diminish property values is that not all people agree that views of wind turbines are undesirable. As reported by the tax assessors, some residents find views [of] the wind turbines attractive. If a homeowner dislikes having a view of the wind

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<sup>6</sup> *The Effect of Wind Development on Local Property Values*, by the Renewable Energy Policy Project, May 2003, available at [www.crest.org/articles/status/1/binaries/wind\\_online\\_final.pdf](http://www.crest.org/articles/status/1/binaries/wind_online_final.pdf)

<sup>7</sup> See: *Public Acceptance Study of the Searsburg Wind Power Project – One Year Post Construction*, December 1997, by J. Palmer; *Attitudes and Expectancies about Wind Turbines and Wind Farms*, 1989, by M. Wolsink, in *Wind Engineering* 13(4): 196-206; *The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis*, December 2009, by Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer and Gautam Sethi, Lawrence Berkeley National Laboratory, page 8;

<sup>8</sup> See: Vermont PSB Docket number 7250, April 16, 2009, page 29, Finding 98.

<sup>9</sup> *Economic Impact of Wind Power in Kittitas County*, by ECONorthwest, November 2002, available at [www.kvalley.com/phoenix/Kittitas%20Wind,%20final.pdf](http://www.kvalley.com/phoenix/Kittitas%20Wind,%20final.pdf)

farm, they may move and sell their house to someone who likes the view. In this case property values would not be diminished.”

Based on the above analysis and review, we find no basis for a negative property valuation adjustment to the economic model used herein and believe the model inputs for net property tax changes in Orleans County represent conservative assumptions regarding the economic impact of the proposed development. In addition to using minimum local property tax payments for the proposed wind farm, the demand and property valuation effects from lower property taxes in the host municipality could provide even further economic benefit to the region than presently estimated.

## **Tourism Impacts**

Potential tourism impacts – both positive and negative - associated with the proposed wind farm were also considered in specifying the economic impact model. Given the substantial tourism industry in Vermont and Orleans County, this is a topic of heightened local importance. Following a thorough literature search of academic and other articles on this topic and the specific characteristics of the local tourism sector, we find no empirical basis for a significant adjustment – positive or negative – to likely tourism visitation or expenditures as a result of the proposed Kingdom Community Wind development in Orleans County.

As is the case with property valuations and view preferences, there are conflicting perspectives on whether or not the presence of a wind farm is likely to result in any positive or negative tourism response. As is also the case with property valuation impacts, the analyses performed to date are largely anecdotal and, if scientifically designed (which few are), are survey-based, not outcome-based. While surveys can be valuable indicators of future expectations, opinion and preference, they often do not conform to actual expenditure patterns. There have been no empirical studies that measure regional tourism expenditures before and after a wind farm development, with valid control regions. Without such data it is impossible to assign and quantify a meaningful adjustment metric for tourism expenditures.

There is considerable evidence that wind farms in a number of U.S. and international sites have become tourism draws, including the existing Green Mountain Power facility in Searsburg, Vermont. A report issued by Renewable Energy Vermont states that “[t]he Mt. Snow Haystack Regional Chamber of Commerce reported that of those who made inquiries, about 10% asked for information about the turbines in Searsburg.”<sup>10</sup> There were approximately 1,000 visitors to the Searsburg wind farm reported in 2005,<sup>11</sup> and no indications that the presence of the Searsburg facility has negatively affected area tourism in the 13 years it has been operating. Many other wind farm sites are listed as

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<sup>10</sup> See *The Economic Benefits of Wind Farm Development in Vermont*, Renewable Energy Vermont report by Douglas Hoffer, available at [http://www.revermont.org/windfarm\\_benefits.pdf](http://www.revermont.org/windfarm_benefits.pdf)

<sup>11</sup> See Prefiled Direct testimony of John Zimmerman, Deerfield Wind Project, at page 49, January 2007

local “tourist attractions.”<sup>12</sup> Some sites plan for and encourage tourism, with visitor centers, educational and informational programs, the opportunity to climb wind towers to enjoy the “spectacular views,”<sup>13</sup> and even “the unique experience of staying overnight [at] an operating wind farm” at one Minnesota facility.<sup>14</sup>

If there were formal plans to attract visitors to the proposed Kingdom Community Wind facility, including the development of a visitor center, guided tours, educational activities, tower viewing platforms and related promotional efforts, it is possible the development could represent a measurable tourism enhancement to the area.<sup>15</sup> Without this, there will be some tourism interest, but probably not extensive enough to warrant any upward model adjustment.

Based on the 13 year experience associated with tourism impacts from the current wind farm in Searsburg, the relatively small tourism sector in and around Lowell that may be affected by the proposed wind farm,<sup>16</sup> and the absence of any credible scientific studies that associate negative tourism impacts with the presence of wind turbines, it is likely that any economic impacts on the tourism sector in the region from this project – positive or negative - are likely to be negligible.

### **In-State Purchases of Kingdom Community Wind Power**

Because all of the electricity produced by the KCW facility will be purchased in-State, there could be significant additional positive economic impacts to the State and region from access to stably-priced, below-market electric power over the life of the facility. If future natural gas (especially) and other fuel price increases create a substantial gap between wind power and market power costs, there could be further economic benefits from this project to Vermont ratepayers. These impacts were not included in the economic model, and thus represent additional potential benefits from the project to the State of Vermont and to the specific region of the State served by the facility.

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<sup>12</sup> See, for example, the Green Mountain Wind Farm near Garrett, PA, as listed in the local public library page: [www.meyesdalelibrary.com/tgreen.html](http://www.meyesdalelibrary.com/tgreen.html); The Fenner Wind Farm in Madison County, NY, featured in the County's tourism guide at: <http://www.madisoncountytourism.com/showmem.php?category=Things%20to%20Do>; The Prince Edward Island wind farm in Canada, which boasts a visitor center, restaurant and gift shop; The Tierras Morenas Wind Farm located on pristine Lake Arenal in Costa Rica, which is advertised as an attraction for visitors at lakeside hotels; and the Palm Springs Wind Farm, in Palm Springs, California, a major tourist destination, which draws 6,000-10,000 visitors per year, despite charging \$10-\$25 per visitor.

<sup>13</sup> As reported at the Swaffham, Norfolk (UK) wind farm, where “over 50,000 tourists have climbed the wind turbine tower.” See: [http://yes2wind.com/tourism\\_debunk.html](http://yes2wind.com/tourism_debunk.html), December 19, 2005

<sup>14</sup> The Buffalo Ridge Wind Towers are listed as a tourist attraction in the Hendricks, MN area, and offer overnight stays. For more information, see: [www.hendricksmn.com/wind\\_towers.html](http://www.hendricksmn.com/wind_towers.html)

<sup>15</sup> In order to avoid any potential negative wildlife impacts, and in response to Vermont Agency of Natural Resources concerns regarding bear habitat, limitations on tourist visitation at the Searsburg wind farm have been placed on the facility. Similar restrictions might also apply in the case of the proposed facility if tourism visitation was to be promoted.

<sup>16</sup> Essex and Orleans Counties combined account for less than 3% of all Vermont Meals and Rooms tax revenues, and Lowell is not listed as reporting meals, rooms or alcohol receipts in any of the past 5 years. This may mean there are no taxable receipts, or that there are fewer than 10 reporting units in the town, thus creating disclosure issues. In either event, the absence or paucity of such establishments suggests that any potential negative economic impacts are relatively minor.